

SFUND RECORDS CTR
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A	Field Sampling Forms
B	Field Equipment Operation Manuals
C	Field Sampling Procedures
D	Quality Assurance/ Quality Control(QA/QC) Plan
E	Health and Safety Plan

1. INTRODUCTION

On behalf of the Department of Toxic Substances Control, DTSC, Tetra Tech has prepared the following workplan for the Alco Pacific Inc. facility, hereinafter referred to as the "Site". The Site is located at 16914 S. Broadway in the City of Carson, County of Los Angeles. (Figure 1, the Site location map.)

As described below, Alco Pacific recycled lead batteries and in the process, contaminated the site. The purpose of the remedial investigation is ascertain the extent of contamination from the activities of Alco Pacific Inc. The investigation will involve soil, groundwater, and soil gas sampling throughout the site. The feasibility study will utilize the data obtained from the investigation to determine remediation strategies and the best remedial alternative.

The objective of the workplan is to provide a detailed plan and rationale for the geophysical, soil vapor, groundwater, and soil investigations. The workplan includes stand-alone documents including: Field Sampling Procedures in Appendix C, the Quality Assurance/Quality Control Plan in Appendix D, and the Health & Safety Plan in Appendix E.

1.1 Site Background

Alco Mining Smelting Company began operating in 1950 a lead reclamation facility at the Site. The company changed names to Alco Mining Company in 1961 and then to Alco Pacific Inc. Alco reclaimed spent lead-acid storage batteries and other lead-bearing materials including: lead-bearing scrap and flue dust from battery manufacturing plants, linetype drosses from the printing industry, plates and groups from batteries broken off-site, and sump muds and wastewater treatment sludges from a variety of industries. [A dross is defined as the scum that forms on the surface of molten metal.] In addition, Alco recovered the lead and casted lead sail boat keels and large sand molds. Refer to Figure 2, Site Plot Plan. This figure depicts the facility as it appears in 1997, based on Tetra Tech Site visits.

Throughout the 1950s and 1960s, Alco disposed of battery acid by mixing the acid with cooling water from the smelter furnace and dumping it into a dry well or into a cesspool lined with bricks (Ecology and Environment Inc., 1988). In 1959, Alco was given a Notice of Violation and Order to Comply by the County of Los Angeles, Department of County/Engineer, Industrial Waste Division. The notice ordered Alco to cease discharging battery acid waste to the cesspool and to have the cesspool pumped out by September, 1959. Alco did not comply with this Order until the 1970s when Alco installed a clarifier and filled the cesspool with rocks.

In the 1950's and 1960's, battery cases were opened and crushed with saw, hammers, or a guillotine device. By 1988, the crushing of the batteries was performed in a closed box. The batteries were collected on pallets in the south yard in a designated storage area. From there, the batteries were fed to an automated decasing and materials separation process which crushed the batteries and separated the lead-bearing compounds from recyclable polyethylene, spent

electrolyte, rubber and PVC casing material, and separators. There were two major waste streams generated: battery acid consisting of sulfuric acid, and shredded battery casings.

The battery acid stream was in a liquid state and was sent through the wastewater treatment system. A central sump collected rinsate for treatment in the wastewater treatment system. The sump had a capacity of 864 gallons. Underground pipelines conveyed acid from the central sump to the sewer system and between the acid collection tanks. The tanks were located at the eastern property boundary, east of the warehouse (Lake Engineering, 1988). According to a DTSC report, the wastewater treatment system consisted of three 5,000-gallon settling tanks, one 300-gallon neutralization tank with anhydrous ammonia, and one underground sewer interceptor tank (DTSC, Feb. 1990). The liquid was treated to remove lead and other metals and then neutralized prior to discharge into the sewer system.

The second major waste stream consisted of shredded battery casings. Polyethylene chips were blown directly into a roll-off bin for shipment to a plastics recycler. Lead-bearing oxides and other compounds were discharged to metal holding bins for smelting in the rotary furnace. Airborne particulates such as flue dust was collected and stored in bags beneath the baghouse located in the southeast section of the property. Slag was accumulated in a waste pile prior to shipment to Nevada for disposal. Rubber and PVC chips were stored in separate waste piles in the northeast corner and north of the warehouse respectively. Rubber chips and slag were the only by-products which left the plant for disposal.

Spills of the battery electrolyte were directly neutralized and absorbed by applying solid soda ash. The resulting salt was swept and/or shoveled into containers and then sent to the rotary furnace to recover lead.

According to Lake Engineering (1988) chemical analyses were performed for the by-products leaving the Site. Recyclable materials were excepted from regulation and therefore the feed materials received from off-site, batteries, plant scrap, and drosses did not require chemical analyses.

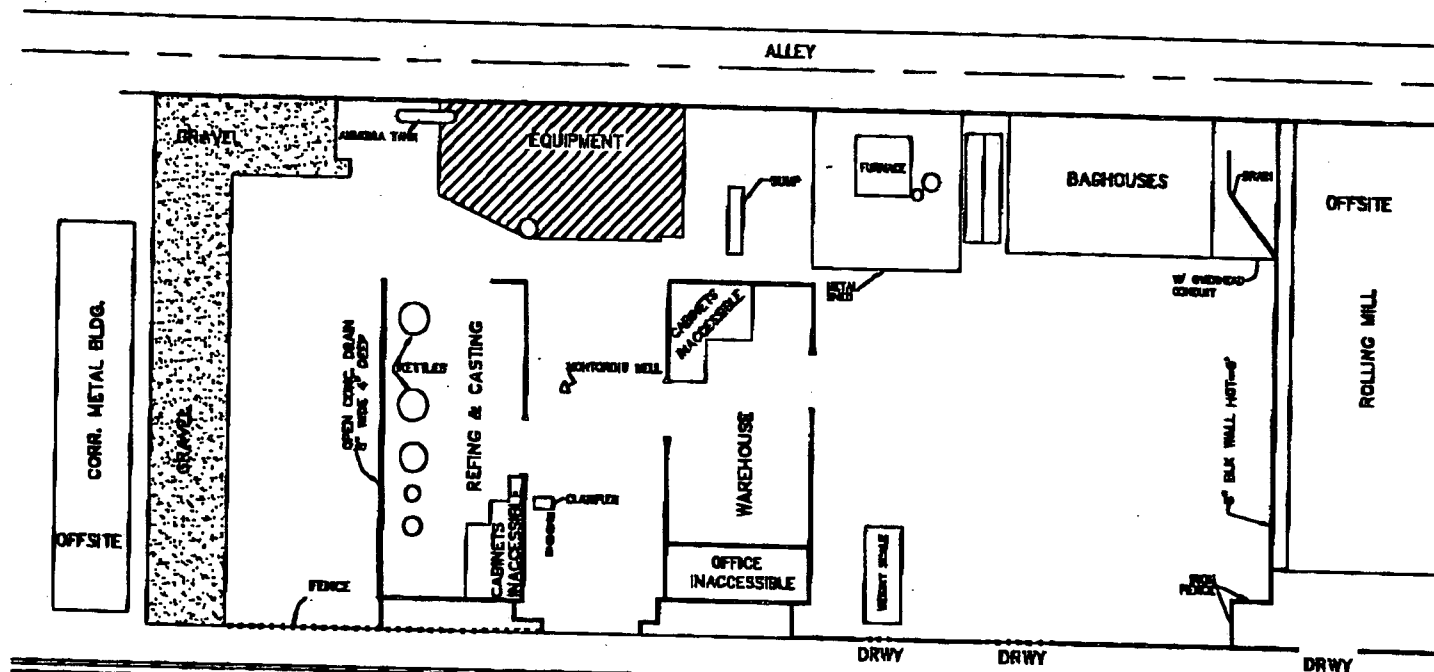
Alco ceased battery operations in December 1989 (J.L. Shepard & Assoc., 1997), but continued to make sailboat keels until 1993, according to the DTSC. Alco submitted a Facility Closure Plan in November 1990 which called for cleaning and moving the battery breaker, furnace, baghouse, and scrubber from the Site. The DTSC filed an injunction with the Superior Court of California, County of Los Angeles, on October 29, 1990 that enjoined and restrained Alco from continuing its battery decasing and furnace operations beginning November 16, 1990.

1.2 Hazardous Materials

The Site contained lead batteries, battery acid, rubber and PVC chips, and low level radioactive waste. All significant piles of waste have been removed by the DTSC (refer to the Previous Removal Activities, Section 1.5).

168TH ST

SHERMAN AVE



S. BROADWAY



DEPARTMENT OF TOXIC SUBSTANCES CONTROL
ALCO PACIFIC INC. FACILITY
16914 S. BROADWAY STREET
CARSON, CALIFORNIA

Figure 2 - Site Plot Plan



TETRA TECH, INC.
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PASADENA, CA 91107
(626) 351-4884

TC 1711-02

1.3 Topography

The Site is in the Los Angeles Basin, a physiographic lowland area between the Transverse Ranges, (Santa Monica and San Gabriel Mountains), which are north of the Site, and the Peninsular Ranges (Santa Ana Mountains), which are located south of the Site. The Los Angeles Basin is filled with a thick sequence of Miocene to Recent age sediment. Units of significance in the area where the Site is located consist of the late Pleistocene age deposits of the Lakewood Formation.

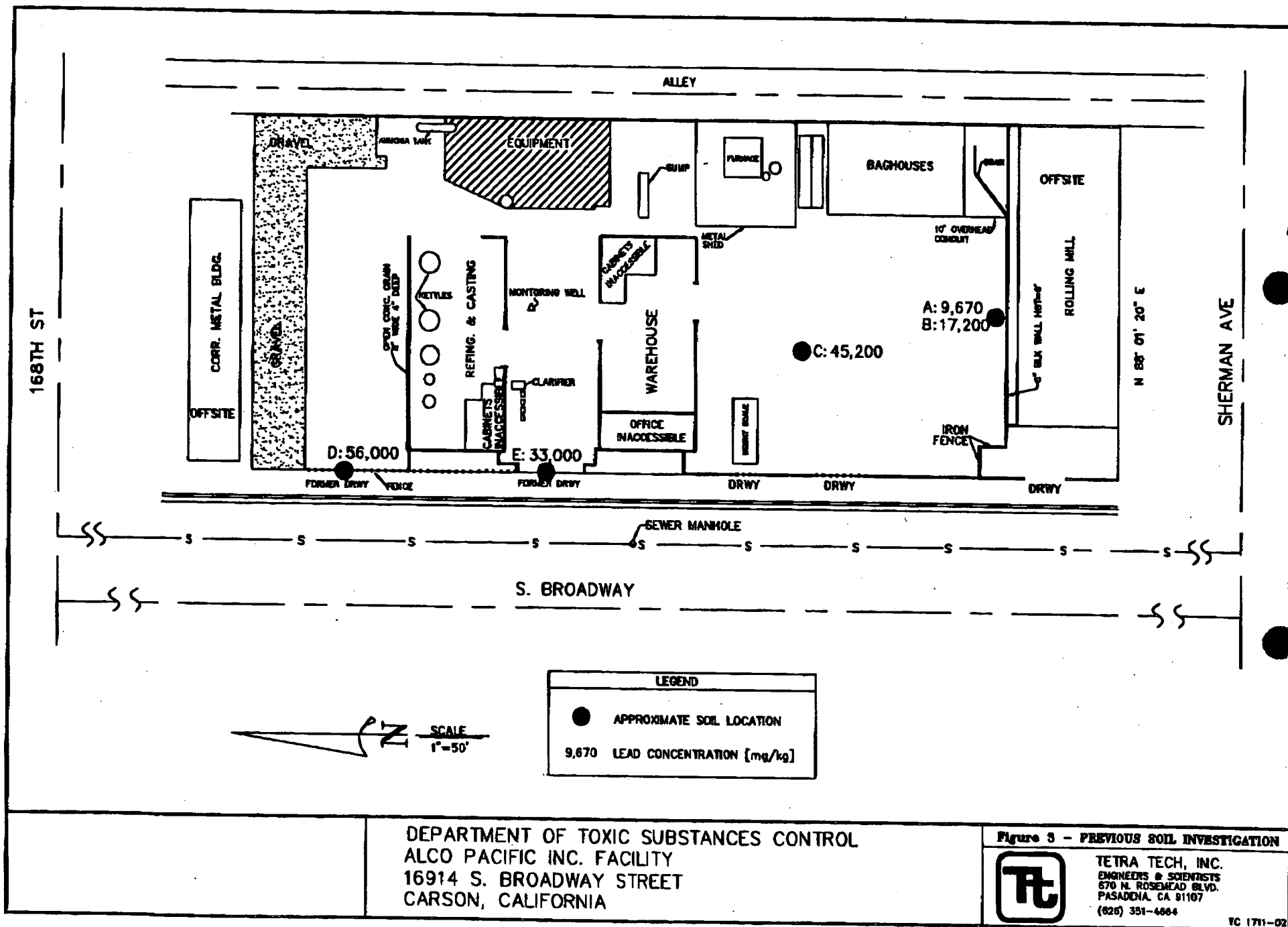
In the Site area, the Lakewood Formation can be divided into three units: a lower sandy unit called the Gage Aquifer, a middle unit of interbedded silt, sand, and clay called the Bellflower Aquiclude overlying the Gage, and an upper sand and silt unit called the Semiperched Aquifer that overlies the Bellflower. The Gage Aquifer consists of blue gray to gray, well sorted, fine-grained sand with some medium-grained sand. The top of the Gage is approximately 85 to 90 feet below ground surface (bgs), corresponding to 60 feet to 65 feet below mean sea level (msl). The Bellflower Aquiclude consists of medium to thick beds of blue gray to green gray silt and clay, well sorted, very fine to fine grained sand, and minor amounts of well sorted medium-grained sand with shell fragments. The top of the Bellflower is approximately 65 feet to 70 feet bgs, corresponding to 40 feet to 45 feet below msl. The Semiperched Aquifer consists of medium beds of olive brown, yellow brown to olive gray, moderate to well sorted silty, very fine-grained and fine-grained sand.

1.4 Previous Site Investigations

The DTSC performed four sampling investigations: three soil sampling and one groundwater sampling from the well existing on-site. The soil sampling events were performed on June 5, 1990, January 19, 1993, and March 1, 1993. The groundwater sampling occurred on December 12, 1993. All soil investigations confirmed the presence of lead in high levels, above the regulatory limit of 1,000 mg/kg (ppm) based upon the Total Threshold Limit Concentration (TTLC). All soil samples were taken from the ground surface, up to 4 inches below ground surface, without the use of hand augers (refer to Figures 3 and 4 for a depiction of on-site and off-site sampling locations and lead concentrations). Other contaminants found at a significant level were cadmium and antimony with TTLC values of 500 and 100 mg/kg (parts per million, ppm) respectively. The analytical results of soil samples collected on June 5 1990 showed antimony concentration of 1700 ppm in the northern driveway.

The groundwater sampling investigation results showed a total lead concentration of 129 mg/l. The sample was not filtered so dissolved lead was not quantified below 25 µg/l which is above the drinking water maximum contaminant level (MCL) of 5 µg/l. The groundwater samples results had volatile organic compounds of: trichloroethene (TCE) at 32 µg/l, tetrachloroethene (PCE) at 10 µg/l, and 1,1 dichloroethene (DCE) at 8.6 µg/l. The DTSC concluded that the solvents are at industrial background levels and have probably migrated to the Site from outside sources. Alco is not suspected of using or recycling solvents (DTSC 1993).

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DEPARTMENT OF TOXIC SUBSTANCES CONTROL
ALCO PACIFIC INC. FACILITY
16914 S. BROADWAY STREET
CARSON, CALIFORNIA

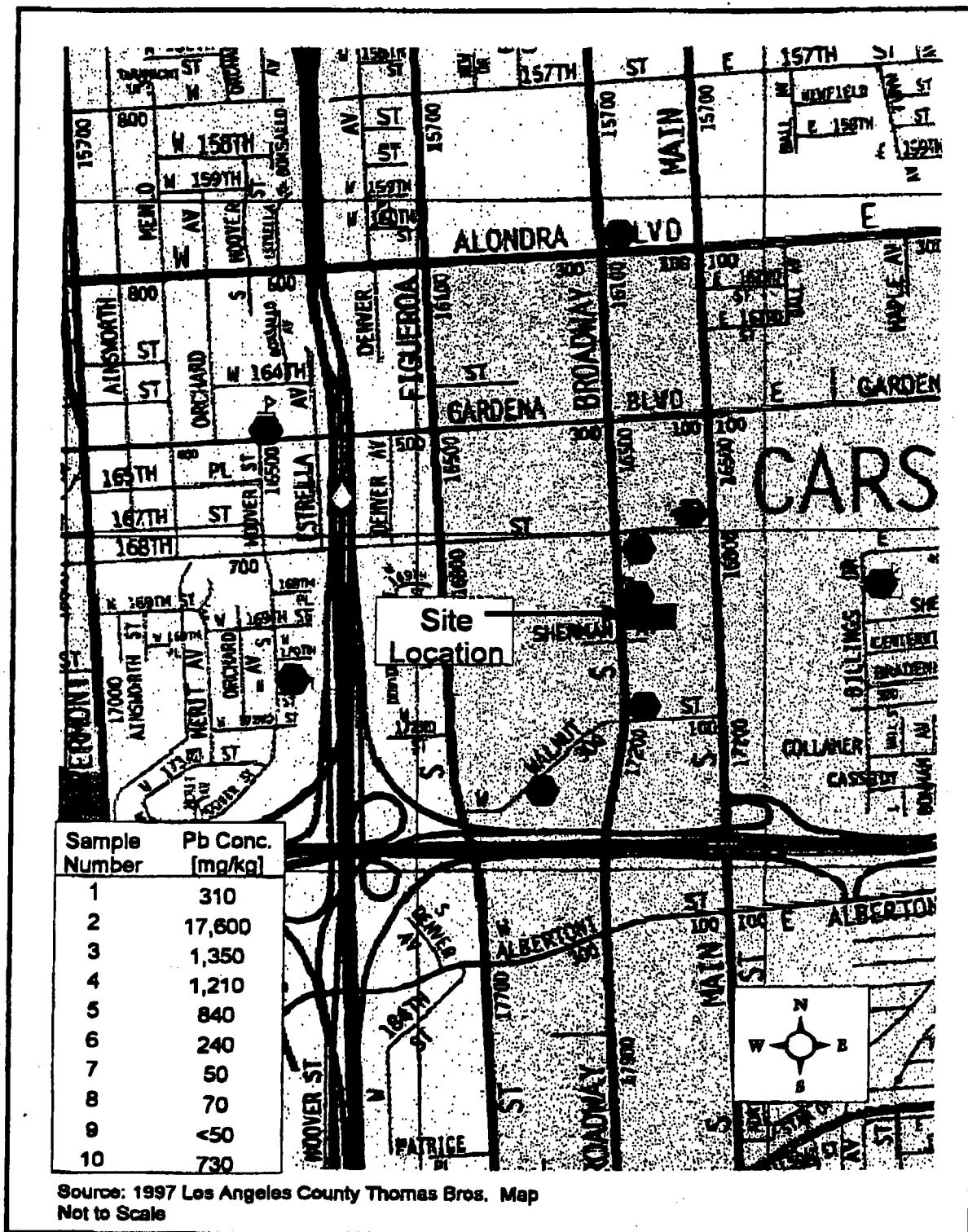
Figure 3 - PREVIOUS SOIL INVESTIGATION



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VC 1711-02

Figure 4
Off-Site Soil Sampling Locations



1.5 Previous Removal Actions

Alco Pacific closed in December 1989, with approximately 1400 cubic yards of hazardous wastes in open piles, 46 drums of liquid and solid wastes, and 52 drums of radioactive mixed waste. DTSC conducted removal actions, beginning in November 1993 and finishing in April 1994 to remove all wastes, except for the radioactive waste. The radioactive waste stayed on-site until a facility was located that would accept the waste. The radioactive waste removal was completed on July 18, 1997. (J.L. Shepard & Assoc., 1997)

1.6 Current Site Status

At the preparation time of this document, all equipment remains on-site, in various states of assembly. Figure 1 depicts the current layout of the facility. The Site currently contains approximately five 55-gallon drums of unknown waste and quantities. Some of the equipment is in-place, while other pieces have been slowly dismantled by a transient who has made the Site his home. The roof of the warehouse has been partially disassembled. DTSC has asked the transient to vacate on several occasions.

There are two buildings on-site, the warehouse and refining casting facility, a shed above the rotary furnace, and a shed above the wastewater treatment equipment. The rolling mill building is located at the southern end of the property. The rolling mill was used by Alco as part of the recycling operations, but is not considered part of the Site for this workplan and any investigative work covered by this workplan. The building is currently used by another company and it is separated from the rest of the Alco property by a 7-foot high brick wall.

Some of the smaller sized equipment: the concrete sailboat keel molds, trash dumpsters, bookshelves, tables, etceteras, can easily be relocated via a backhoe. Other equipment is relatively fixed such as: the baghouses, kettles, water treatment tanks, and cannot be easily moved.

1.7 Community Participation

Tetra Tech will obtain from DTSC a fact sheet/information letter, translate the letter into Spanish, and mail the bilingual letter to residents located within 1/2 mile from the Site. Tetra Tech will obtain the list of residents and their addresses from DTSC.

1.8 Technical Approach

Conceptual Site Model

The conceptual site model (CSM) provides a description of the links between contaminant sources at the Site, the chemicals of potential concern, the mechanisms by which contaminant transport or migration may occur in the environment, and the persons potentially exposed to the contaminants. The CSM was developed to guide the Site investigation activities, including the selection of environmental media to be sampled, the analytical methods used to identify

chemicals of potential concern, and the identification of complete exposure pathways for which quantitative analyses should be conducted as part of the risk assessment. Thus, a key aspect of the CSM is the determination of potentially complete exposure pathways, including the points in the environment at which persons may be exposed to contaminants and the routes (e.g., ingestion) of contaminant exposure.

Based upon Site history, Chart 1 was developed as the preliminary conceptual site model (CSM). The CSM indicates that one of the primary sources of contamination at this former lead reclamation facility is the furnace and kettles. Lead and other heavy metals are likely to have been released in these areas. Other source of potential contamination includes the sump muds, wastewater treatment sludges, and waste piles containing shredded battery casings, foundry sands, and rubber or polypropylene materials. The chemicals of potential concern in these areas include heavy metals and possibly volatile organic compounds (VOCs). Metals and VOCs have also been detected in the groundwater sampled at the Site.

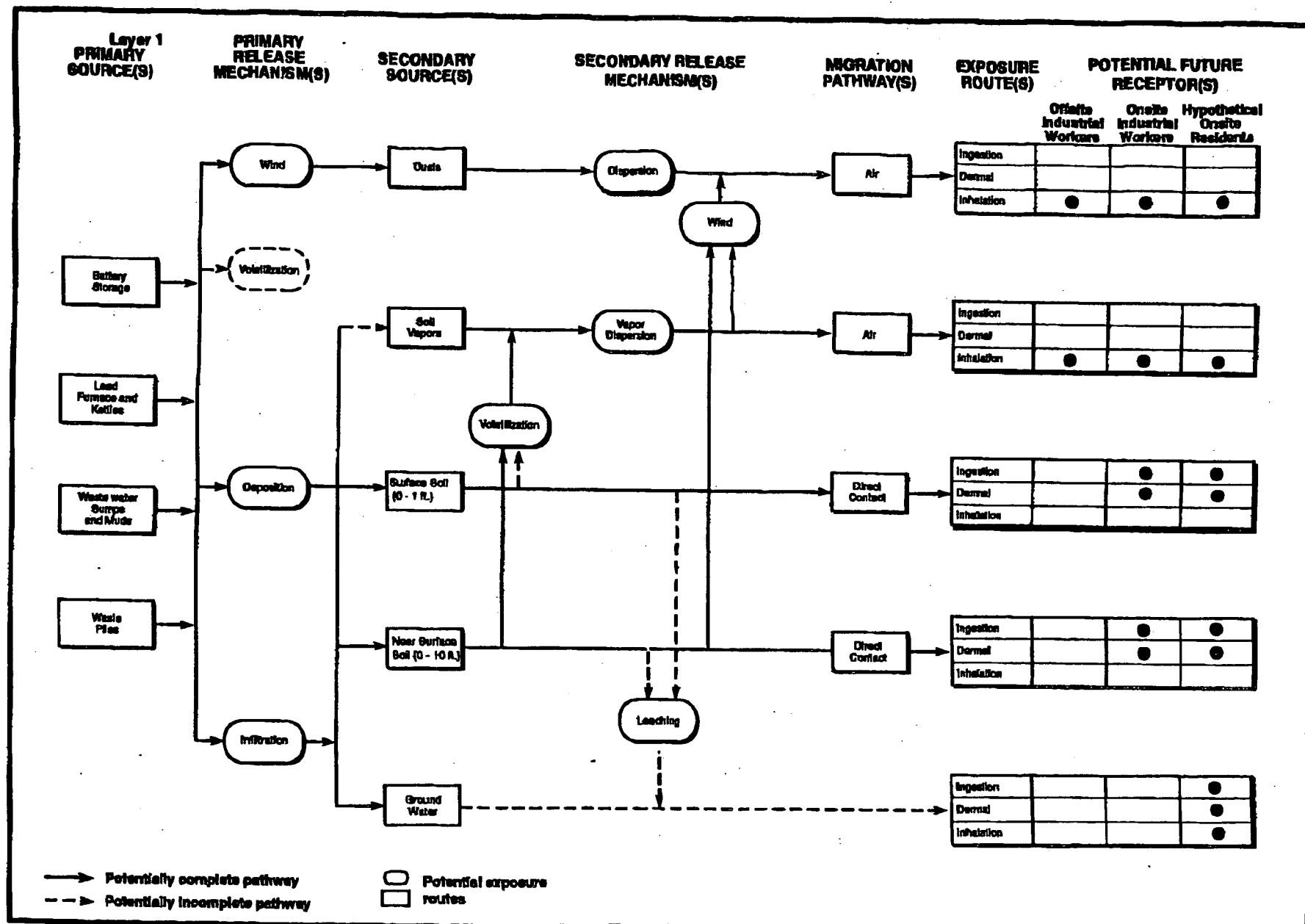
Potentially Complete Exposure Pathways

Each of the contaminant sources shown in the CSM may contribute to potential contaminant exposure. Potential exposure routes at this site include direct soil contact (i.e., ingestion and dermal contact) and dust inhalation. Depending on the sampling results, exposures may also occur via vapor inhalation and use of groundwater for potable purposes. Groundwater sampling will provide analysis of whether total and dissolved concentrations of metals, such as lead, are elevated over background concentrations and drinking water standards, i.e., maximum contaminant levels (MCLs). In addition, VOCs have been detected in groundwater at the site, but it is uncertain whether contaminant sources at the site have contributed to this contamination. DTSC (1993) indicated that the former facility is not suspected of using solvents. Measurements of contaminants in soil gases, in conjunction with chemical fate transport analyses, will aid in determining whether VOCs in soil could impact groundwater.

Since the Site is located in an industrialized area and currently is vacant, the most likely type of receptors to be exposed to chemicals of potential concern are future on-site or off-site workers. However, to provide an indication of risks associated with unrestricted site use, exposure will also be considered for future on-site residents.

Following the remedial investigation, the CSM will be updated as part of the RI after the new sampling data are collected, fate and transport analyses have been conducted, and additional information is gathered regarding potential receptors.

CHART 1 CONCEPTUAL SITE MODEL



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ECOLOGY & ENVIRONMENT

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TOTAL P.13

Former Alco Pacific Inc. Facility
Final RI/FS Workplan

Tetra Tech, Inc.
February 18, 1998

2. REMOVAL ACTION

The equipment on-site is in various stages of assembly. Some of the equipment may be a hindrance to the investigation. Therefore it would be beneficial to remove as much of the equipment as possible prior to the investigation. Targeted equipment for removal are the assorted water treatment equipment location around the sump area, the baghouses, and tanks.

Tetra Tech will arrange testing of any equipment designated for off-site disposal prior to shipping under Subtask 3. Any demolition, dismantling, or removal of potentially contaminated equipment will be performed in compliance with 8 CCR 1532 Construction Safety Orders for Cadmium and 8 CCR 1532.1 Construction Safety Orders for Lead. Tetra Tech will contact various contractors to remove as much of the equipment as possible for the contract amount in Subtask 3 of the scope of work.

Tetra Tech will provide DTSC with a report describing the results of the removal action and presenting recommendations.

3. GEOPHYSICAL SURVEY

Before any subsurface drilling is performed, a geophysical survey will be performed to clear each of the subsurface sampling locations (soil gas, soil boring, and monitoring well locations) and to determine if there are any underground storage tanks (USTs) present on the Site. Site maps obtained from the DTSC and the Los Angeles County Department of Public Works do not list utility lines. The City of Carson does not have any utility maps for the property.

Two geophysical instruments, a ground penetrating radar unit (GPR) and a magnetometer (Mag), will be used to survey the Site for subsurface features. In addition, an electromagnetic pipe and cable locator may be used to trace the path, or shape of subsurface structures detected by the GPR and Mag surveys. All geophysical survey field work, data reduction and data interpretation will be performed under the direction of a State of California Registered Geophysicist.

3.1 Magnetometry

The Site will be measured and staked out on a 10-foot by 10-foot square grid. Measurements of the local magnetic field will be made at each grid point using a magnetometer. The magnetic field measurements will be plotted on a Site map and magnetic field contours will be sketched on the map to identify magnetic field anomalies. Any anomalies detected will be flagged on the ground and further investigated. Magnetometer readings and field maps showing magnetic field contours will be included in the RI/FS report.

3.2 Ground Penetrating Radar

A GPR system will be used to locate subsurface anomalies along each of the grid lines. The GPR unit will be pulled along a line indicated by the magnetometer grid points. This will produce a series of parallel GPR profiles at a spacing of 3 meters. In areas where anomalies are detected, or magnetometer anomalies were plotted, additional GPR profiles, perpendicular to the original profiles, will be recorded. This will help determine the shape, trend, and size of subsurface structures causing the anomalies.

The GPR system transducer emits radar waves into the soil and plots the return signal. The return signal return time is based on variations in the di-electric properties of subsurface materials. Different soil types, concrete, and metals all have sufficiently different di-electric properties to be detected by GPR methods. Consequently, GPR is effective for detecting both metallic and non-metallic materials and structures. If USTs are present on the Site, the GPR equipment will be able to detect them.

Utility lines will be marked and sampling points that cross any lines will be relocated as necessary. Since Alco vacated the Site with all equipment on-site, it is presumed that none of the utility lines were disconnected or capped.

In addition to the geophysical survey, Underground Service Alert (USA), a utility locator service, will be contacted to mark utility lines around the Site prior to initiation of the subsurface investigation.

3.3 Letter Report

Tetra Tech will provide DTSC with a report describing the results of the geophysical investigation and presenting recommendations.

4. SOIL GAS INVESTIGATION

The objective of the soil gas survey program will be to determine if volatile organic compounds (VOCs) are present in subsurface soils beneath the Site. Soil gas sampling will be performed to provide an assessment of the Site to evaluate all areas where solvents or other chemicals may have had the potential to have been discharged to the environment based on past operations at the facility. The intent of the soil gas sampling will be to either detect and quantify VOCs at the facility or provide sufficient data to provide verification that no further assessment is warranted.

Due to the processes performed at the Site, it is unlikely that VOCs are present in subsurface soils. Therefore a targeted soil gas investigation is proposed to assess specific operational areas of concern. Tetra Tech proposes to sample at 20 target locations, collecting samples at 5 feet below ground surface (bgs), 15 feet bgs, and 30 feet bgs. If the drill rig cannot collect a 30-foot bgs sample, a sample will be collected from the deepest interval possible.

Soil gas sampling will be accomplished by driving a steel rod to the target depth and extracting soil vapor through a sampling tube, set within the steel rod. A detailed description of the soil gas sampling and analysis procedures is presented in Section 4.1. A map of the proposed sampling locations is shown on Figure 5. A large scale drawing, Plate 1, (D size), is located in the back of this workplan.

4.1 Soil Gas Collection

Soil gas samples will be collected from depths of 5 feet bgs, 15 feet bgs and 30 feet bgs, or at the deepest depth possible. Sampling probes will be connected to $\frac{1}{4}$ -inch NylafloTM tubing set within the steel rod driving pipe. The steel rod will drive the vapor sampling probes to the 30 feet sampling depth (or the deepest interval possible) using a Geoprobe system that will allow penetration through coarse sediments. Once the probe has reached the 30 feet sampling depth, the steel rod will be withdrawn as sand is poured into the sampling annulus, followed by bentonite until the steel drive rod has reached the next sampling interval, 15 feet. A new tube is put into the drive rod and the process following sampling intervals. The final result will be three tubes, one for each sampling interval.

All down-hole sampling equipment will be decontaminated between soil gas points. At the completion of the soil gas sampling, the open boring will be backfilled with bentonite / cement grout.

4.2 Purging and Sampling of Vapor Probes

Soil gas samples will be collected using a soil gas sampling system constructed of stainless-steel, glass, Nylaflow™, and Teflon™ components. Instrumentation associated with the sampling system will include a calibrated flow-meter and vacuum gauge. Vacuum integrity of the sampling system will be tested prior to, and after the soil gas survey. Soil gas sampling probes will be purged at a flow rate of approximately 150 milliliters per minute (ml/min).

An initial purge test will be performed to evaluate the appropriate volume of gas to be purged prior to sample collection. The purge test will consist of extracting 1, 2, 4, 6, 8 and 10 times the Nylaflow™ tube and sample probe volume prior to analysis. Analytical results associated with each purge volume will be plotted to determine the optimal purge volume prior to sampling. After purging, soil gas samples will be collected from the sample stream using a summa canister. The summa canisters with a chain of custody will be sent to Associated Laboratories for analysis via the laboratory's courier.

4.3 Soil Gas Sample Analyses

Soil gas samples will be analyzed by Associated Laboratories with a gas chromatograph or a gas chromatograph mass spectrometer. This instrument will be used to analyze soil gas samples for aromatic and halogenated hydrocarbons using a method similar to EPA Method 8010/8020 or EPA Method 8240. The detection limits for the aromatic and halogenated hydrocarbons analyses will be typically one microgram per liter (µg/l). The targeted VOCs are listed below in Table 4-1.

TABLE 4-1
Target Halogenated and Aromatic Organic Compounds

Acetone	1,1-Dichloroethene	Styrene
Benzene	cis-1,2-Dichloroethene	Tetrachloroethene
Bromodichloromethane	trans 1-2-Dichloroethene	1,1,1,2-Tetrachloroethane
Bromoform	1,2 -Dichloropropane	1,1,2,2-Tetrachloroethane
Bromomethane	cis-1,3 -Dichloropropene	Toluene
2-Butanone	Dibromochloromethane	trans-1,3-Dichloropropene
Carbon Tetrachloride	Ethylbenzene	Trichloroethene
Chlorobenzene	Freon-11, 12, 113, 22, 141B	1,1,1-Trichloroethane
Chloroethane	2-Hexanone	1,1,2-Trichloroethane
Chloroform	4-Methyl-2-Pentanone	Vinyl Chloride
1,1-Dichloroethane	Dichloromethane	Xylene (total)
1,2-Dichloroethane	(Methylene Chloride)	

4.4 Sample Review

The soil gas results will be reported within five to seven working days of sample delivery to Associated Laboratories, unless DTSC specifies otherwise. If a location indicates high concentrations of VOCs, Tetra Tech will discuss the results with the DTSC Project Manager and upon approval by the DTSC, additional soil gas sampling will be conducted at locations 20 feet from the sample in four directions (north, south, east, and west) to delineate the extent of contamination.

4.5 Letter Report

Tetra Tech will provide DTSC with a report describing the results of the soil gas survey and presenting recommendations.

5. SUBSURFACE INVESTIGATION

5.1 Boring Locations

The Site is approximately one acre in size. It has two main buildings (approximately 3600 sq. ft. each) and there is a considerable amount of processing equipment and related structures on the Site that will present access problems for the subsurface investigation. In all, approximately one-third of the Site is covered by buildings, process equipment, and debris from the previous lead recycling operation. The removal action described in Section 2 of this workplan is intended to clear loose debris and some of the process related equipment from areas where soil borings are proposed. At those boring locations where sufficient space cannot be provided for a limited access drill rig, an attempt will be made to assess the location by hand augering.

In order to provide a thorough assessment of the Site, soil borings will be drilled at both target features (clarifier, sump, waste storage areas, hot metal areas, etc.) and on a 25-foot grid across the entire Site area. Since the contaminants of concern for this Site are metals (primarily lead), which are not highly mobile in soil, soil boring depths can be limited in general to the upper 10 feet across most of the Site. Soil borings targeted are the hot metal casting kettles, clarifier, central sump and the drains will be completed to 40 feet bgs. Information from the on-site groundwater well indicates that first groundwater will be encountered at approximately 40 feet bgs.

Tetra Tech proposes to drill 55 shallow borings based on a 25-foot grid. Since there is asphalt and concrete covering approximately 95% of the Site, a limited access drill rig will be used instead of hand augering the borings. A direct push technology, Geoprobe or Stratoprobe, will be utilized for soil drilling. This will minimize drill cuttings. All boring locations with a concrete surface will be cored before drilling.

The borings will be drilled to 10 feet below ground surface (bgs), with samples taken at the surface (which is considered 0 - 6 inches bgs), 2 feet, 5 feet, and 10 feet bgs. The borings will be a minimum of two inches in diameter. Additional samples will be collected if visible evidence of contamination is observed. In addition to visual evidence, a TN Spectrace 9000 Portable X-Ray Fluorescence Analyzer (XRF) will be used to screen 10% of the 10 foot soil samples for contamination. The XRF machine will be operated by a licensed operator employed by the EPA, under contract with the DTSC.

Figure 5 (page 13) depicts the proposed location of the borings. Each boring is identified by a column letter and row number, beginning with A'1 and ending with M6.

ASBESTOS Large equipment remains on-site as well as office furniture, storage racks, and scrap materials. Therefore some areas are considered inaccessible for the subsurface investigation and some of the sample locations have been moved slightly from the 25-foot interval due to their placement within an inaccessible area. The western portion of the warehouse is considered inaccessible due to possible asbestos insulation material from the roof and other roofing materials spread

haphazardly throughout the office. The building dates back to the 1950's when asbestos was a common material for insulation. Therefore when drilling in the warehouse or any other building, careful clearance will be performed and adequate precautions taken to avoid exposing potential asbestos.

The 25-foot grid suggested two borings be drilled in the warehouse office. However, it would be unlikely that lead contamination would be in the office. For any subsurface drilling to take place in the office, an asbestos survey would have to be performed, which is not part of this scope of work.

Prior to any removal action, the area east of the refining/casting building and east of the warehouse is inaccessible with pieces of equipment placed close together randomly. Therefore borings D1, E1, and I1 may need to be moved to avoid the equipment. Borings J2 and K2 may need to be moved slightly to allow for access in between the baghouse funnels. These five borings as well as boring H1 may be hand-augered if the limited access drill rig cannot access these boring locations. Cuttings from the hand-auger borings will be collected into 55-gallon drums, labeled, and characterized for proper disposal.

Other boring locations have been adjusted from the 25-foot grid due to placement of equipment that is fixed; that will not be removed during the removal action. Boring H5 has been moved slightly north from the 25-foot grid point due to interference of the scale. Borings D2 and D3 have been moved slightly north due to interference with the warehouse wall.

Drains
Besides the 25-foot grid points, there are six areas of interest in which lead and other metals may have been transported below a depth of 10 feet due to the placement of underground features. The clarifier, kettles in the refining/casting building, central sump, two drains, and a suspected liquid waste discharge area are areas of concern. One boring will be placed adjacent to the clarifier, Grid E5; two borings will be adjacent to the central sump, Grids G1 and G2, one at the eastern edge and western edge respectively. During Tetra Tech's two site visits, the sump area was inundated with water from recent rainstorms and it was unclear as to the state of the sump (intact, cracked, etc.). Three borings will be drilled under three kettles in the refining/casting building. The borings will be slanted to collect samples below the center of the kettles. One drain is located at the southeast corner of the property, south of the baghouse. It terminates at the brick wall. The other drain is located along the north outside edge of the refining/casting building. According to a 1975 Site map, the drain spanned the entire length of the building. The low point is at the northwest building edge and therefore a boring will be located there in Grid C6. The suspected liquid waste discharge area is located at the northeastern property boundary, north of the ammonia tank. The location contains a plant growing through the concrete. It has been alleged that Alco dumped liquid wastes at that location. Therefore a deep boring has been targeted at that location.

*Dry well -
Talk to
Morris
about
site visit*
The borings at the clarifier, sump, kettles, two drains, and suspected dumping location will be drilled to 40 feet bgs. Soil samples will be collected at 6 inches, 1 foot, and thence every 5 feet to the bottom of each boring. The samples will be analyzed by Associated Laboratories to the 10-foot bgs sample initially. If the 10-foot sample indicates high concentrations of lead and/or *KRF*

XRF

other metals of concern, then the samples from deeper intervals will be analyzed. In addition, the XRF will be utilized to pre-screen the 40 foot samples. If the XRF machine indicates high levels of metal contamination, then the borings will be drilled deeper, until the XRF machine indicates no contamination or refusal is reached.

5.2 Drilling Procedures

Each boring location will be cleared in the geophysical investigation. Locations may be moved to avoid utility lines. Any changes to boring locations will be recorded in Tetra Tech's field logbook(s) and daily field reports.

The majority of the boreholes will be drilled using a Geoprobe or Stratoprobe type, direct-push method, drilling system on a limited access rig. The advantage of the direct-push system is that drill cuttings are minimized, which means limited excess soil to analyze and dispose. A Geoprobe sampler consists of a standard split spoon with piston assembly added to control the sampling depth. Upon reaching the desired depth for sampling, the piston is unlocked and the sampler is advanced into the soil as the piston retracts. Samples will be collected in standard retainer sleeves made of stainless steel or brass and at a minimum of 2 inches in diameter.

The split spoon sampler will have a minimum of three sleeves for each sample collected. One sleeve will be used to log the boring, another for the volatiles screening (PID or FID field screening), and the third for chemical analysis.

Each soil sample will be screened for volatile organic compounds using a photo-ionization detector (PID) or a flame-ionization detector (FID). The PID/FID will be calibrated at the beginning of each day. Background readings will be taken and recorded at the beginning of the day for comparison. The soil sample will be placed into a ziploc bag for ten minutes before the PID/FID probe tip is inserted. The readings will be noted on the boring log. Sample intervals with high VOC readings, greater than 25 ppm, will be tested for volatile organics, EPA method 8260A.

The sampler coring tube will be decontaminated after each sample is collected using laboratory-grade detergent, rinsed with tap water, followed by a distilled water rinse. Rinsate will be collected and transferred into a labeled 55 gallon drum pending analysis.

All boreholes will be sealed by pouring a cement-bentonite mix into the open borehole and tamping to ensure that the boreholes are properly sealed.

5.3 Sample Collection

The drill rig will send the drive tube down to the sampling depth and use a split spoon sampler to collect the soil sample in three stainless steel or brass sleeves. One sleeve sample will be used to log the boring and then the soil will be placed into a 55 gallon drum for disposal. Teflon sheets will be placed at each end of the two remaining sleeves and then sealed with plastic end caps. One sleeve will be shaken, then one end cap cut in an X shape and screened for volatiles by the

PID/FID. Once the reading is recorded, the soil will be placed into the 55 gallon drum with the other soil pending analysis and disposal. The third sleeve will be labeled with a unique sample number, the date and time the sample was collected, analytical tests needed, and the sampler's initials, and then placed in an ice chest with "Blue Ice" and sent to Associated Laboratories for analysis.

Soil samples will be picked up by the laboratory's courier the same day that they are collected or within five days of the holding times. A Chain of custody will be filled out and signed by the sample collector, laboratory courier, and by the person receiving the samples at the designated laboratory. Tetra Tech will obtain and keep copies of all chain of custodies.

5.4 Laboratory Analysis

The samples will be labeled with the date, sampler, boring location, analyses to be performed, and sent with a chain of custody to the laboratory for analysis. The laboratory for this project is Associated Laboratories, located in Orange, CA. Samples from below 2 feet will be archived at the laboratory in a cooled environment. If those samples are to be analyzed, the laboratory will be sent written instructions for each sample and the type of analyses to be performed.

The samples to be analyzed initially will be tested for Title 22 metals TTLc, EPA method 6010A as well as Chromium VI (Cr+6), EPA method 7196A. Previous soil investigations showed concentrations of antimony, arsenic, beryllium, cadmium, as well as lead at levels above the preliminary remediation goals (PRGs) for residential property (EPA 1996). Therefore the initial soil samples from each boring will be analyzed for all Title 22 metals to clearly define the metals of concern at the Site. After the initial round of samples analyzed if it is noted that lead is the only contaminant of concern, then any future samples to be analyzed after the initial testing will only be tested for lead by EPA method 7421.

To reduce the cost of sample analysis, the 5 and 10-foot soil samples will be analyzed for metals only if the 2-foot samples within each boring show high levels of contamination. However, to ensure that the subsurface is extensively investigated, a few random samples from the 5-foot and 10-foot intervals will be analyzed. These random samples will be determined in the field by the Project Geologist based upon field observations. If the ten foot samples reported high levels of lead, then a re-evaluation of the Site will be performed, delineating specific areas of concern.

5.5 Letter Report

Tetra Tech will provide DTSC with a report describing the results of the soil sampling investigation and presenting recommendations.

Table 5.1
Estimated Number of Analyses per Sampling Depth

	No. of Sampling Locations	Laboratory Analyses	
		Title 22 Metals	Chromium VI
Surface samples	64	64	64
2 feet bgs	64	64	64
5 feet bgs	64	15	15
10 feet bgs	64	15	15
15 feet bgs	9	To be determined	To be determined
20 feet bgs and 5 foot intervals up to 40 feet bgs	9	To be determined	To be determined
Subtotal	64	158	158
QA samples*		16	16
Total	64	174	174

* The QA samples will be the greater of either 1/day or 10% of the total number of samples taken each day, whichever is greater.

6. GROUNDWATER INVESTIGATION

6.1 Boring Locations for Installation of Monitoring Wells

Tetra Tech proposes to install three wells immediately following the soil sampling investigation to utilize the drill rig. The three wells will be placed at a maximum distance apart on the Site to provide the best spacing to determine groundwater gradient. The wells will be drilled to a maximum depth of 65 feet below ground surface (bgs) or until the drillers reach the Bellflower Aquiclude.

The proposed monitoring well locations are in Grid A1, at the northeast corner of the Site, in Grid L2 at the southwest corner of the Site, and in Grid H6, southwest of the warehouse building. There is an existing well on-site, located south of the refining/casting building and north of the warehouse. The depth to groundwater in this well reported by the DTSC in 1993 was 38 feet bgs and the total depth was 60.5 feet bgs. It is unknown who installed the well. Neither the Los Angeles County Department of Public Works (LADPW), the California Department of Water Resources, nor the DTSC have any installation information regarding the existing well on-site. Therefore the reasons for stopping at 60.5 feet bgs is unclear, but it appears that the well was installed above the Bellflower Aquiclude.

Tetra Tech obtained boring logs and groundwater information from the LADPW on four wells in the vicinity of the Site. These four wells were drilled prior to 1950 and the boring logs are imprecise (Figure 6). The closest well to the Site, 822F, is located 110 feet north of the intersection of Broadway and Walnut and 375 feet west of the center of Broadway. The most recent monitoring of this well occurred in 1986. The depth to groundwater was 44.4 feet or an elevation of 11.4 feet below mean sea level (msl). Well 822A is located northeast of the Site, at 168th Street, 280 feet east of the center of Main Street. In 1986 the depth to groundwater was 92.2 feet or an elevation of 55.4 feet below msl. In 1994 the groundwater elevation was 41 feet below msl which is the most recent monitoring date.

Well 822B is located east of the Site, 80 feet east of the center of Main Street and 500 feet south of 168th Street, in the property at 16920 S. Main Street. It was last sampled in 1989 with a depth to groundwater of 57.8 feet, corresponding to a groundwater elevation of 21.8 feet below msl. Well 822FF is located southwest of the Site, on the west side of Broadway, south of the 91 Freeway and north of Albertoni Street. It was last sampled in 1981 with a depth to groundwater of 67.6 feet corresponding to a groundwater elevation of 40.6 feet below msl.

The well closest to the Site has shown the shallowest groundwater elevation. Since monitoring of these wells has not been consistent, it is difficult to conclude the depth of the perched aquifer and its relation to the Dominguez Channel, which is located southwest of the Site. It appears that the channel recharges the perched aquifer. DTSC's 1993 groundwater sampling investigation at the Site reported metals as well as volatile organic compounds: TCE, PCE, and 1,1 DCE.

However DTSC concluded that the levels of solvents were indicative of background levels and not due to Alco's activities. Solvents are not suspected of being contaminants of concern for the Site.

6.2 Well Drilling/Construction

The wells will be constructed using the same drill rig for the soil samples with a different drill head to conduct hollow stem auger drilling. Direct push technology is capable of drilling to depths of 80' bgs and greater, depending upon the drill rig utilized. All well borings will be continuously cored. A registered geologist will log the borings according to the Unified Soil Classification System (USCS).

Two of the borings will be continuously cored for visual stratification of contamination, unless it is deemed unnecessary by Tetra Tech's Task Manager and DTSC's Project Manager. The borings will be sampled at six inches, two feet, five feet bgs, and at five foot intervals thereafter until 65 feet bgs or to the Bellflower Aquiclude, whichever is reached first. Additional soil samples may be collected if visible evidence of contamination is observed. Each soil sample will be screened with a photoionization detector (PID) or a flame ionization detector (FID) as described in the soil investigation procedure in Section 5 and marked on the boring log. Samples with PID/FID greater than 25 ppm will be analyzed for VOCs, in addition to pH, Chromium VI, and Title 22 metals.

The soil samples will be sent to the laboratory immediately after collection because the lab must analyze for Chromium VI within 24 hours of collection. The sampling will be coordinated with Associated Laboratories to ensure samples will be analyzed within the 24 hour holding limit.

Each well will be screened at approximately 40 to 60 feet bgs. The screening intervals may be altered, based upon field conditions. Monitoring wells will be constructed using 2-inch diameter schedule 40 PVC casing and factory slotted screens. Screen and filter pack will be determined based on field sieve analysis of soil collected from the screened interval. A sand pack, bentonite, and cement-bentonite grout will be introduced into the annular spacing around the blank casing. Centralizers will be used to centralize each well casing within each borehole. The sand filter pack will be installed via a tremmy pipe, surged, and sounded to prevent bridging. Since the wells will be located on-site, locks are not necessary. However each well will be permanently marked with an identification number on the well top or cement seal. In addition, the top of casing will be permanently marked with a small notch and permanent ink pen to be used as a permanent reference point from which water level measurements will be made. The mark will be surveyed by a licensed surveyor. Figure 7 depicts a typical as-built well cross section.



MONITORING WELL CONSTRUCTION SPECIFICATIONS

FIGURE 7

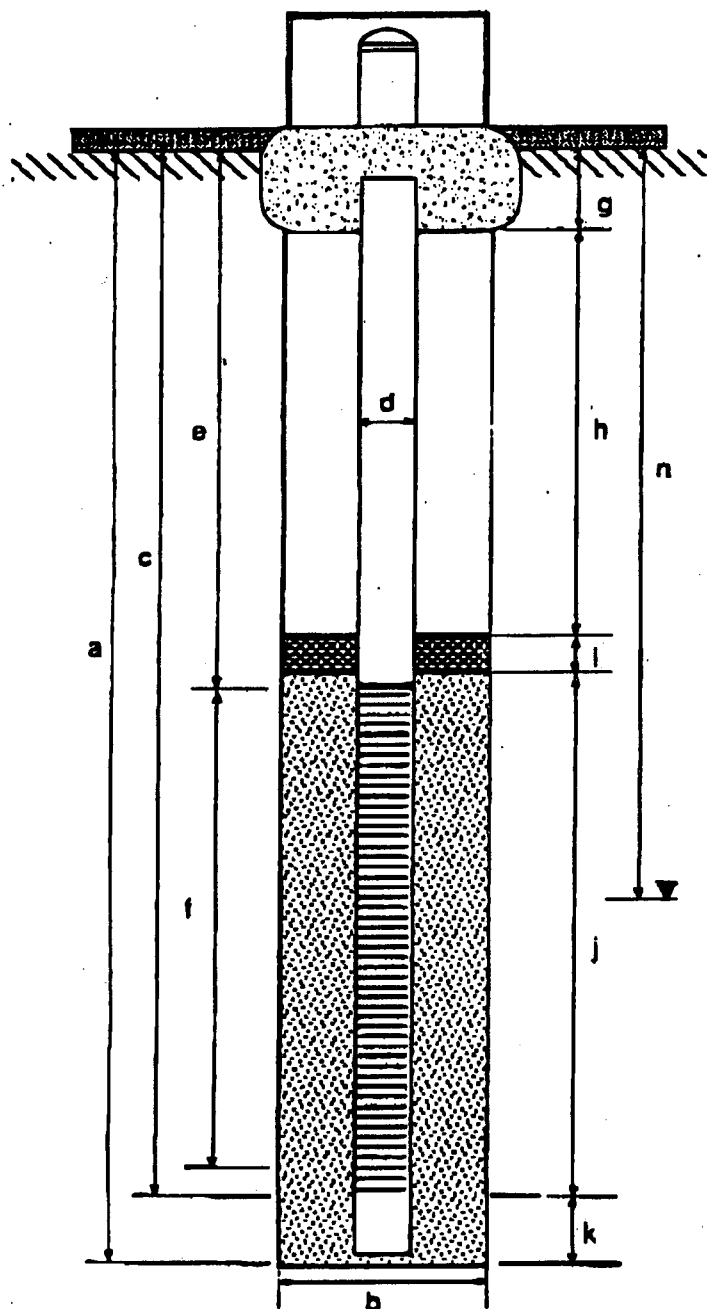
CLIENT _____ BORING WELL # _____ DATE _____
 PROJECT # _____ GEOLOGIST _____
 PROJECT NAME _____ SIGNATURE _____
 COUNTY _____ REGISTRATION _____
 WELL PERMIT # _____
 DRILLING CONTRACTOR _____

EXPLORATORY BORING

a. TOTAL DEPTH _____ ft.
 b. DIAMETER _____ in.
 DRILLING METHOD _____

WELL CONSTRUCTION

c. TOTAL CASING LENGTH _____ ft.
 MATERIAL _____
 d. INSIDE DIAMETER _____ in.
 e. DEPTH TO TOP PERFORATIONS _____ ft.
 f. PERFORATED LENGTH _____ ft.
 PERFORATED INTERVAL FROM _____ TO _____ ft.
 PERFORATION TYPE _____
 PERFORATION SIZE _____
 g. SURFACE SEAL _____ ft.
 SEAL MATERIAL _____
 h. BACKFILL _____ ft.
 BACKFILL MATERIAL _____
 i. SEAL _____ ft.
 SEAL MATERIAL _____
 j. GRAVEL PACK _____ ft.
 PACK MATERIAL _____
 k. SEDIMENT TRAP _____ ft.
 l. WELL COVER DIAMETER _____ in.
 m. CONCRETE PAD DIAMETER _____ ft.
 THICKNESS _____ in.
 n. APPROXIMATE GROUND WATER DEPTH _____ ft.



6.3 Well Development

The three new wells will be developed 24 hours following construction to allow ample time for the grout to cure. Well development consists of two steps: 1) mechanical surging and 2) pumping/bailing. Mechanical surging consists of operating a surge plunger or swab to force water into and out of the screen, which is similar to a piston acting in a cylinder. The well will then be pumped or mechanically bailed to remove suspended sediments and other materials that may have been introduced into the well during the installation and surging process. Using well diameter, total depth, and depth to water information, the amount of water composing three well volumes will be calculated. The formula for one well volume is:

Equation 1:

$$1 \text{ Well Volume} = (1/2 \text{ Well inner diameter})^2 (\text{ft}^2) \times \pi \times \text{Height of standing water (ft)}$$

Height of standing water = total well depth minus depth to groundwater

Three well volumes of water will be removed as a minimum from the well. If an acceptable water clarity has not been reached after pumping three well volumes, then additional well volumes will be removed until an acceptable water clarity is achieved. The wells will be left to settle and reach equilibrium for a minimum of 72 hours prior to collecting groundwater samples.

All development water will be containerized and staged on-site in 55-gallon drums, with appropriate labels, pending analytical results of the groundwater samples. Once the results have been received by Tetra Tech, the water will be disposed of according to state, federal, and local regulations. Refer to the Waste Transportation Plan, Section 7, for details.

6.4 Well Purging

All monitoring wells are required to be purged prior to sampling because the water standing in a monitoring well may not be representative of in-situ groundwater quality. Sampling will be conducted for all four wells on-site, including the existing monitoring well. The purging of the wells will take place at least 72 hours after developing the three newly installed wells.

For each well, the depth to standing water will be recorded as well as total depth (which should be 60.5 feet for the existing well according to the DTSC 1993 sampling report). Based upon well diameters and the information gathered, the volume of stagnant water in each well will be calculated (refer to equation 1). Then three well volumes will be purged from each well. Purged water will be collected in 55-gallon drums pending laboratory analysis. As described above, the drums will be disposed of according to state, federal, and local regulations.

Indicator parameters: temperature, pH, and conductivity will be measured and recorded for stability purposes. Turbidity will be monitored, but will not be used as a stabilization parameter. Stability is reached if over three consecutive readings each of pH, conductivity, and temperature remain relatively constant. For each well the parameters will be measured and recorded at least 6

times, one for each half-well casing volume using a YSI 3560 meter (or equivalent) equipped with a flow-thru cell. PH must vary no more than 0.1 points in the pH scale, conductivity must vary no more than 10%, and temperature must vary no more than 1.0°C. If the three parameters have not stabilized after three well volumes, the purging will continue to a maximum of five volumes before sampling commences. Field meters for conductivity and pH will be calibrated before purging of each well and decontaminated after purging of each well.

For step-by-step instructions, refer to Appendix C, Field Sampling Procedures.

6.5 Groundwater Sampling

All four monitoring wells on-site, the three new wells and the well previously installed, will be sampled. The sampling will occur after purging the four wells. The water level in each well must recover at least 80% prior to sampling. The samples will be collected using dedicated disposable bailers. A clean teflon bailer will be used for each well. Prepared sample containers will be provided by Associated Laboratories prior to sampling and kept in chilled coolers. Any preservatives required will be placed in the appropriate container by the laboratory, prior to sampling. HCL will be used as the preservative for VOC samples and HNO₃ will be used as the preservative for both total metals and dissolved metals. Two samples will be collected from each well and analyzed for dissolved metals, EPA method 6010A, pH, and Chromium VI, EPA Method 7196A. The dissolved metal samples will be field filtered using a Posifilter™ pressurized bailer system with a 0.45 µm glass fiber filter. In addition, two wells will be analyzed for volatile organic compounds (VOCs), EPA Method 8260A, to verify that the levels are at the expected background levels for an industrial area, as previously reported by the DTSC. A field blank sample will be included with each set of samples sent to the laboratory.

Table 6.1
Estimated Number of Groundwater Analyses

	No. of Sampling Locations	Laboratory Analyses				
		Title 22 Dissolved Metals*	Title 22 Total Metals	Chromium VI	pH	VOCs
Monitoring Wells	4	4	4	4	4	2
QA samples		1	1	1	1	1
Total	4	5	5	5	5	3

* Dissolved metal samples will be field filtered.

Each sample will be labeled with the date, time of sample collection, name of sampler, analysis to be performed, and Tetra Tech company name.

For step-by-step instructions, refer to Appendix C, Field Sampling Procedures.

6.6 Surveying

After the wells have been installed, the well locations will be surveyed for their exact positions. The Topgun™ total station or equivalent will be utilized to survey the well locations for northing, easting, and elevation coordinates by a licensed surveyor.

6.7 Letter Report

Tetra Tech will provide DTSC with a report describing the results of the installation of the monitoring wells and presenting recommendations.

7 FIELD EQUIPMENT & RECORDKEEPING

The following sections describe the field measurements to be performed during the remedial investigation including equipment calibration and maintenance.

7.1 Field Parameters

All field activities will be monitored using a MINI-RAM and OVA (PID/FID) for health and safety purposes. In addition, the OVA will be used to screen soil samples. A YSI 3560 meter and a Solinst sounder will be used during groundwater sampling.

7.2 Equipment Calibration

Proper maintenance, calibration, and operation of each field instrument will be the responsibility of the field personnel assigned to the project. All instruments and equipment used during the remedial investigation will be maintained, calibrated, and operated according to the manufacturers' guidelines and recommendations. Copies of the manufacturer's instructions are in Appendix B.

Field equipment will be calibrated prior to use in the field as appropriate. The calibration procedures will follow standard manufacturers' instructions to ensure that the equipment is functioning within established tolerances and as required by the project. The frequency of calibration recommended by the factory for the MINI-RAM is every 12 months and for the PID/FID is on a daily basis.

7.3 Equipment Maintenance

Maintenance responsibilities for field equipment will be coordinated through the Task Manager or her designee such as an instrument technician who is responsible for ensuring that available equipment and instrumentation are ready for use, and that returned equipment is checked out, serviced, and returned to available inventory in a timely manner. Maintenance during use is the responsibility of the project team using the equipment. Calibration logbooks will be utilized to record information on instrument maintenance, calibration, and repair. A separate logbook will be maintained for each instrument.